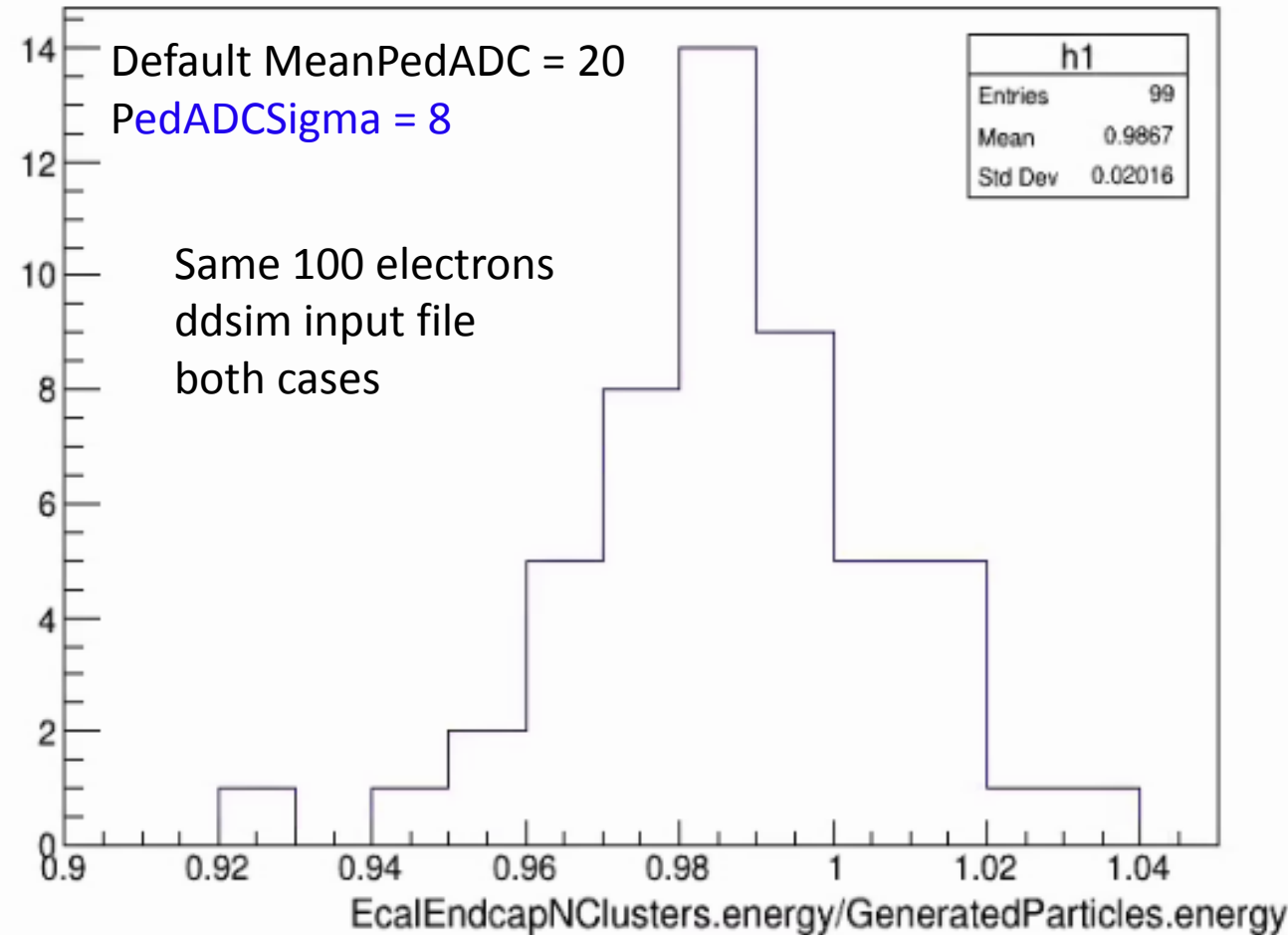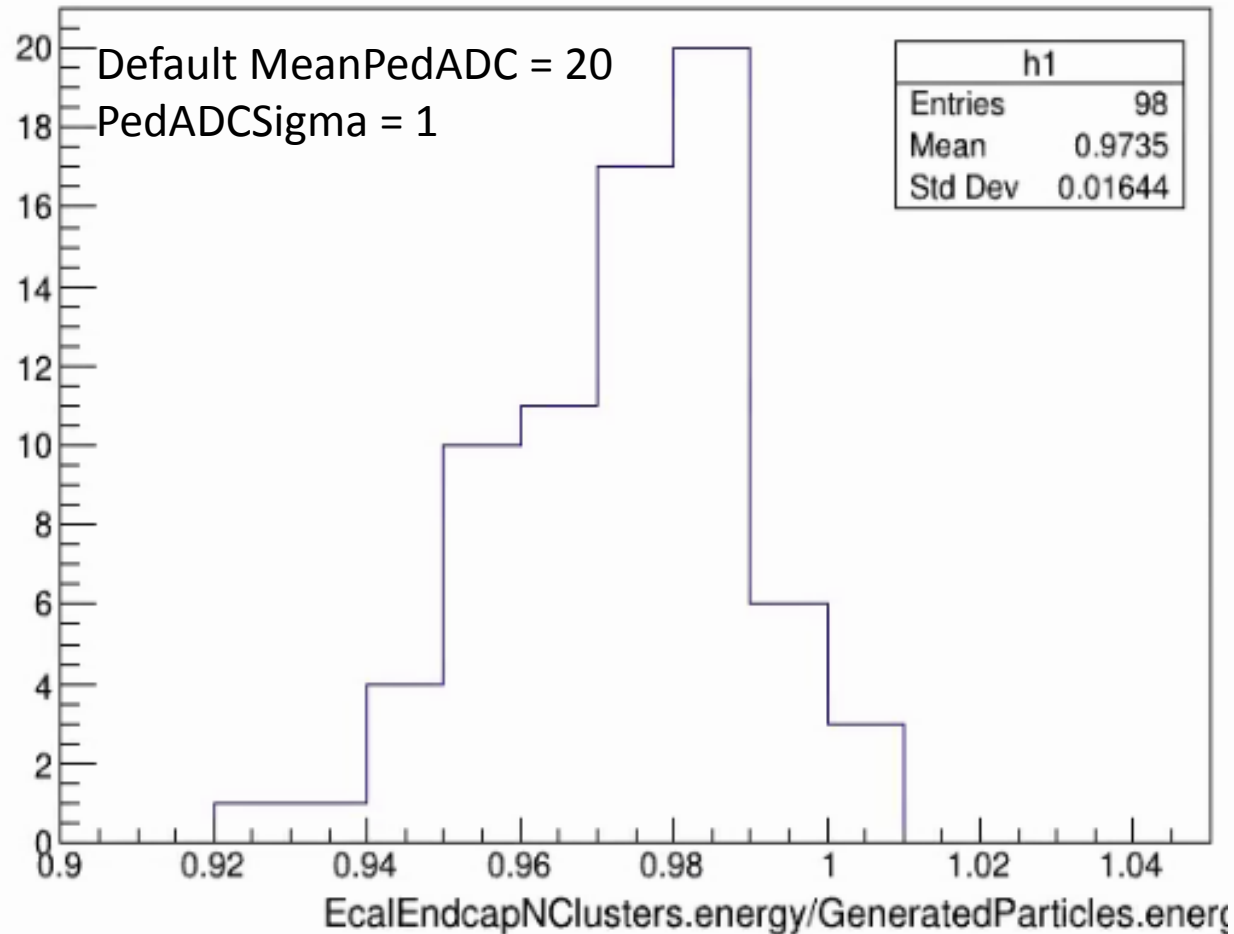# EEEMCal Sim Digitization/Resolutions Code Testing Quick Update

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Input digi params shown last time: are being used

- I was able to build/run single electrons w/ ddsim + eicrecon changing the digitization parameters I presented last time (in backup) to confirm they are being used.

- Once we have more input from siPM testing we can fix the parameters like this noise…

Default MeanPedADC = 20
PedADCSigma = 1

h1	
Entries	98
Mean	0.9735
Std Dev	0.01644

EcalEndcapNClusters.energy/GeneratedParticles.energy

Default MeanPedADC = 20
PedADCSigma = 8

h1	
Entries	99
Mean	0.9867
Std Dev	0.02016

Same 100 electrons
ddsim input file
both cases

EcalEndcapNClusters.energy/GeneratedParticles.energy

Other TODO's

- I haven't yet contacted BEmc people about HGCROC-style digitization/ reco efforts yet but I will soon

- Some comments by Oleg at Calo meeting about possibly more unified efforts for implementing electronics noise or dedicated time @ calo mtg to discuss. I didn't hear when..

- Also I should now be more ready to possibly help with some other sim tasks…

Backup

From [EICrecon](#) /[src](#) /[algorithms](#) /[calorimetry](#) /CalorimeterHitDigi.cc

- decltype(CalorimeterHitDigiConfig::capADC)   EcalEndcapN_capADC = 16384; //65536, 16bit ADC
  decltype(CalorimeterHitDigiConfig::dyRangeADC)   EcalEndcapN_dyRangeADC = 20.0 * dd4hep::GeV;

- decltype(CalorimeterHitDigiConfig::pedMeanADC)   EcalEndcapN_pedMeanADC = 20;

- decltype(CalorimeterHitDigiConfig::pedSigmaADC)   EcalEndcapN_pedSigmaADC = 1;

- decltype(CalorimeterHitDigiConfig::resolutionTDC) EcalEndcapN_resolutionTDC = 10 * dd4hep::picosecond;

-       .capADC = EcalEndcapN_capADC,

-     .dyRangeADC = EcalEndcapN_dyRangeADC,

-     .pedMeanADC = EcalEndcapN_pedMeanADC,

-     .pedSigmaADC = EcalEndcapN_pedSigmaADC,

-     .resolutionTDC = EcalEndcapN_resolutionTDC,

-     .thresholdFactor = 0.0,

-     .thresholdValue = 4.0, // (20. GeV / 16384) * 4 ~= 5 MeV

-     .sampFrac = 0.998,

-     .readout = "EcalEndcapNHits",

-     .sectorField = "sector",

.eRes = {0.0 * sqrt(dd4hep::GeV), 0.02, 0.0 * dd4hep::GeV},
.tRes = 0.0 * dd4hep::ns,
.threshold = 0.0 * dd4hep::MeV, // Use ADC cut instead

Thank you Dmitry, he pointed us to these files, I did not find them myself

From EICrecon/src/detectors/EEMC/EEMC.cc

- unsigned long long adc   = std::llround(ped + edep * m_cfg.corrMeanScale * (1.0 + eResRel) / m_cfg.dyRangeADC * m_cfg.capADC);

- unsigned long long tdc   = std::llround((time + m_rng.gaussian<double>(0., 1.) * tRes) * stepTDC);

previous comments

- Time resolution needs updated to something worse (?) but we don't know what yet...

- E Resolution:
  - no A /sqrtE term [comes from sim] ,
  - constant term [calibration?] 2% too high?   [noise]
  - what is the 1/E term for ? From: https://wiki.jlab.org/cuawiki/index.php/OVERVIEW_OF_SPECIFICATIONS
  - [anyway probably also covered from sim?]

- Leave simple single ADC digi scheme for now... [?]
  - Real digitization with real waveform (discrete ADC) will have much better performance for *energy*
  - ...but for time resolution who knows..
  - Still needing to understand how HGCROC relates..